

ABSTRACT

Crop failures in melon cultivation within greenhouses are often caused by nutrient imbalances, which affect the sweetness and quality of the fruit. Therefore, this study aims to design an Internet of Things (IoT)-based automated system that regulates water levels, nutrient concentrations (PPM), and solution pH in real-time. The system is designed to meet the optimal requirements for melon plants, with pH parameters of 5.5–6.5 and PPM levels of 800–1400. The study focuses on algorithm development, hardware design based on the ESP32 microcontroller, and system integration with a remote monitoring application.

The methods used include designing hardware such as TDS sensors, pH sensors, and water level sensors, as well as software development based on the ESP32 microcontroller. Data from the sensors is processed to control pumps that automatically adjust water levels, nutrient concentrations, and solution pH. The system is also connected to an IoT-based application, enabling real-time monitoring and control through mobile devices.

The test results show that the system successfully maintains nutrient parameters within optimal ranges, reduces manual intervention, and improves nutrient management efficiency. By implementing this system, the productivity and quality of melon harvests in greenhouses can be significantly enhanced.

Kata Kunci: *IoT, automated nutrition, TDS sensor, pH, PPM, melon, greenhouse*